CLAIMS

1. A fuel cell comprising an electrolyte sandwiched by electrodes having a catalyst layer and a gas diffusion layer, or an assembly used therefor, characterized in that (i) the catalyst layer comprises a catalyst-bearing conductive powder particles and a fibrous carbon, and/or (ii) the gas diffusion layer comprises a layer containing a water repellant resin and a fibrous carbon at least part of the surface of the gas diffusion layer in contact with the catalyst layer.

2. A catalyst composition for a cell comprising catalyst-bearing conductive powder particles and fibrous carbon.

3. The catalyst composition for a cell as claimed in claim 2, wherein the catalyst accelerates oxidation-reduction reaction in a fuel cell.

4. The catalyst composition for a cell as claimed in claim 2 or 3, wherein the catalyst is platinum or a platinum alloy.

5. The catalyst composition for a cell as claimed in any one of claims 2 through 4, wherein the conductive powder particles are conductive carbon black or conductive carbonaceous powder particles.

6. The catalyst composition for a cell as claimed in any one of claims 2 through 5, wherein the conductive powder particles are at least one species selected from the group consisting of furnace black, acetylene black, thermal black, channel black, and Ketjen Black.

7. The catalyst composition for a cell as claimed in any one of claims 2 through 6, wherein the fibrous carbon is at least one species selected from the group consisting of PAN-based carbon fiber, pitch-based carbon fiber, and a carbon nano-tube.

8. The catalyst composition for a cell as claimed in any one of claims 2 through 6, wherein the fibrous carbon is vapor grown carbon fiber.

9. The catalyst composition for a cell as claimed

in claim 7 or 8, wherein the entirety of the catalyst-bearing conductive powder particles and the fibrous carbon contains the fibrous carbon in an amount of 0.1-30 mass%.

10. The catalyst composition for a cell as claimed in claim 8 or 9, wherein the vapor grown carbon fiber has been heat-treated at a temperature of at least 2,300°C.

11. The catalyst composition for a cell as claimed in any one of claims 8 through 10, wherein the vapor grown carbon fiber contains boron in an amount of 0.01-10 mass%.

12. The catalyst composition for a cell as claimed in any one of claims 7 through 11, wherein the fibrous carbon has a fiber filament diameter of 10-300 nm.

13. The catalyst composition for a cell as claimed in any one of claims 7 through 12, wherein the fibrous carbon has a fiber filament length of 100 μm or less.

14. An electrode material comprising a conductive substrate and a catalyst layer formed thereon, the catalyst layer containing a catalyst composition for a cell as recited in any one of claims 2 through 13.

15. The electrode material as claimed in claim 14, wherein the conductive substrate is a porous conductive substrate.

16. A polymer electrolyte fuel cell comprising a polymer electrolyte membrane and a pair of electrodes which sandwich the electrolyte membrane, each electrode including a catalyst layer, characterized in that the catalyst layer includes a conductive substrate and a catalyst layer containing catalyst-bearing conductive powder particles and fibrous carbon.

17. A membrane-electrode assembly for a fuel cell comprising an electrolyte membrane and an electrode including a catalyst layer and a gas diffusion layer, the electrode being provided on each surface of the electrolyte membrane, wherein at least a portion of the surface of the gas diffusion layer which is in contact

with the catalyst layer includes a layer containing a hydrophobic resin and fibrous carbon.

18. The membrane-electrode assembly for a fuel cell as claimed in claim 17, wherein at least a portion of the surface of the gas diffusion layer which is in contact with the catalyst layer further includes conductive powder particles.

19. The membrane-electrode assembly for a fuel cell as claimed in claim 17 or 18, wherein at least a portion of the surface of the gas diffusion layer which is in contact with the catalyst layer further includes spaces.

20. The membrane-electrode assembly for a fuel cell as claimed in claim 19, wherein, in a cross section of the gas diffusion layer, the cross section area of spaces having a size of 0.1-50 μm accounts for at least 40% of the total cross section area of all the spaces.

21. The membrane-electrode assembly for a fuel cell as claimed in any one of claims 18 through 20, wherein the conductive powder particles are conductive carbon black or conductive carbon powder particles.

22. The membrane-electrode assembly for a fuel cell as claimed in any one of claims 17 through 21, wherein the fibrous carbon of the layer comprising the hydrophobic resin and the fibrous carbon is vapor grown carbon fiber, and the layer contains the vapor grown carbon fiber in an amount of 1-95 mass%.

23. The membrane-electrode assembly for a fuel cell as claimed in claim 22, wherein the vapor grown carbon fiber has been formed through heat treatment at a temperature of at least 2,000°C.

24. The membrane-electrode assembly for a fuel cell as claimed in claim 22 or 23, wherein the vapor grown carbon fiber contains boron in an amount of 0.01-10 mass%.

25. The membrane-electrode assembly for a fuel cell as claimed in any one of claims 22 through 24, wherein the vapor grown carbon fiber has a fiber filament

diameter of 500 nm or less.

26. The membrane-electrode assembly for a fuel cell as claimed in any one of claims 22 through 25, wherein the vapor grown carbon fiber has a fiber filament length of 100 μm or less.

27. The membrane-electrode assembly for a fuel cell as claimed in any one of claims 17 through 26, wherein the hydrophobic resin is a fluorine-based resin.

28. A process for producing a layer assembly for a fuel cell, comprising a step for forming a gas diffusion layer by applying a conductive porous substrate onto or immersing the conductive porous substrate in a composition comprising conductive powder particles, a hydrophobic resin, and fibrous carbon; a step for forming an electrode by forming a catalyst layer comprising catalyst-bearing carbon particles on the surface of the gas diffusion layer, the composition being applied onto the surface of the gas diffusion layer or the gas diffusion layer being immersed in the composition; and a step for bonding the catalyst layer of the electrode to each surface of an electrolyte membrane.

29. A fuel cell comprising a membrane-electrode assembly as recited in any one of claims 17 through 27 and separators which sandwich the membrane-electrode assembly.

30. A fuel battery comprising at least two fuel cells as recited in claim 29, which are layered together.